PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-229564

(43)Date of publication of application : 25.08.1998

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(51)Int.Cl. H04N 7/32

H04N 7/30

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(30)Priority

Priority number : 08331762

Priority date : 12.12.1996

Priority country : JP

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(54) IMAGE ENCODER, IMAGE DECODER, IMAGE ENCODING METHOD AND IMAGE DECODING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To improve encoding efficiency by adaptively selecting whether to perform encoding/decoding by a field unit or to perform encoding/decoding by a frame unit for respective blocks for shape information images as well at the time encoding/decoding input images.

SOLUTION: Binary digital images divided into two-dimensional blocks constituted of plural picture elements are inputted to a frame encoding means 16 and a field encoding means 17 as input image signals for the respective blocks and an encoding processing is respectively performed. Then, the code amounts of encoded image signals from the frame encoding means 16 and the field

encoding means 17 are compared by a mode judgement means 67, the encoded image signals of a less code amount are selected by a switching means 12 and a multiplex means 13 outputs mode information 149 and the encoded image signals 142 as bit stream signals 14 by multiplexing. Thus, the encoding efficiency is improved corresponding to the movement of moving images.

LEGAL STATUS [Date of request for examination] 21.04.1999

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3191753

[Date of registration] 25.05.2001

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]

[Claim 1] The image coding equipment characterized by to provide a mode judging means divides a binary digital image into the two-dimensional block which consists of two or more pixels, judges the approach of performing coding processing per field, and the approach of performing per frame for every block in the image coding equipment which encodes for every block, and output mode information, and the coding means which encode per a field unit or frame for every block according to said mode information.

[Claim 2] Image decryption equipment characterized by providing a decryption means to perform decryption processing per a field unit or frame for every block

in the image decryption equipment decrypted to a binary digital image according to mode information from the image coded signal encoded with image coding equipment according to claim 1.

[Claim 3] Image coding equipment according to claim 1 characterized by providing a mode judging means to judge for every block whether a down sampling is performed per field, or a down sampling is performed per frame, and to output mode information, and a down sampling means to perform a down sampling per a field unit or frame for every block according to said mode information in case a binary digital image is encoded.

[Claim 4] Image decryption equipment according to claim 2 characterized by providing a rise sampling means to choose for every block whether a rise sampling is performed per field according to mode information, or a rise sampling is performed per frame, and to perform a rise sampling per a field unit or frame in case it decrypts to a binary digital image from the image coded signal encoded with image coding equipment according to claim 3.

[Claim 5] Image coding equipment according to claim 1 characterized by providing a mode judging means to judge for every block whether a motion compensation is performed per field, or a motion compensation is performed per frame, and to output mode information, and a motion compensation means to perform a motion compensation per a field unit or frame for every block

according to said mode information in case a binary digital image is encoded.

[Claim 6] Image decryption equipment according to claim 2 characterized by providing a motion compensation means to judge for every block whether a motion compensation is performed per field according to mode information, or a motion compensation is performed per frame, and to perform a motion compensation in case a binary digital image is decrypted from the image coded signal encoded with image coding equipment according to claim 5.

[Claim 7] A mode judging means to judge for every block whether the location which carries out a pixel value change is detected per field in case a binary digital image is encoded, or it carries out per frame, and to output mode information, A change check appearance means to detect a pixel value-change point according to said mode information, A prediction means to predict the pixel value-change location of said digital image from the pixel value-change location of a pixel [finishing / coding] according to said mode information, the difference of the changing point prediction location predicted by the location and said prediction means of the changing point detected by said change check appearance means -- the image coding equipment according to claim 1 characterized by providing a differential-encoding means to encode a value.

[Claim 8] the time of decrypting a binary digital image from the image coded signal encoded with image coding equipment according to claim 7 -- the

difference of the prediction location of a pixel value-change point and a changing point -- the difference which decrypts a value -- with a decryption means A prediction means to predict the prediction location of a pixel value-change point to the pixel value-change point of a pixel [finishing / a decryption] for every block according to mode information, mode information -- following -- said difference -- the difference decrypted by the decryption means -- the image decryption equipment according to claim 2 which possesses an addition means to add the prediction location predicted by the value and said prediction means, and makes the output of said addition means a pixel value-change location.

[Claim 9] A mode judging means to judge for every block whether the distribution condition of the pixel value of the surrounding encoded pixel of a view pixel is investigated per field, or it carries out per frame, and to output mode information in case a binary digital image is encoded, A probability-distribution decision means to determine the probability distribution of the pixel value of a view pixel from the distribution condition of the pixel value of a surrounding encoded pixel according to said mode information, Image coding equipment according to claim 1 characterized by providing a pixel value coding means to encode the pixel value of a view pixel according to the probability distribution determined with said probability-distribution decision means.

[Claim 10] In case a binary digital image is decrypted from the image coded

signal encoded with image coding equipment according to claim 9 A probability-distribution decision means to conduct investigation of the distribution condition of the pixel value of a circumference pixel [finishing / a decryption / already] per a field unit or frame for every block according to mode information, and to determine the probability distribution of the pixel value of a view pixel, Image decryption equipment according to claim 2 characterized by providing a pixel value decryption means to decrypt the pixel value of a view pixel according to the probability distribution determined with said probability-distribution decision means.

[Claim 11] A mode judging means to judge for every block whether the distribution condition of the pixel value of the motion compensation prediction image obtained by performing a motion compensation based on a reference image [finishing / coding] in case a binary digital image is encoded is investigated per field, or it carries out per frame, and to output mode information, A probability-distribution decision means to determine the probability distribution of the pixel value of a view pixel from the distribution condition of the pixel value of a motion compensation prediction image according to said mode information, Image coding equipment according to claim 1 characterized by providing a pixel value coding means to encode the pixel value of a view pixel according to the probability distribution determined with said probability-distribution decision

means.

[Claim 12] In case a binary digital image is decrypted from the image coded signal encoded with image coding equipment according to claim 11 By performing a motion compensation based on a reference image [finishing / a decryption / already] A probability-distribution decision means to conduct investigation of the distribution condition of the pixel value of the motion compensation prediction image obtained per a field unit or frame for every block according to mode information for every block, and to determine the probability distribution of the pixel value of a view pixel, Image decryption equipment according to claim 2 characterized by providing a pixel value decryption means to decrypt the pixel value of a view pixel according to the probability distribution determined with said probability-distribution decision means.

[Claim 13] The image coding equipment according to claim 1 which carries out [providing a mode judging means judges for every block whether coding processing of a digital color picture is performed per field, or it carries out per frame in case the binary digital image which shows the significant configuration of a digital color picture and said color picture is encoded for every block, and output mode information, and a binary digital-image coding means are a field unit or perform coding processing of the binary digital image of the block concerned per frame according to said mode information, and] as the

description.

[Claim 14] Image decryption equipment according to claim 2 characterized by providing a binary digital image decryption means to perform decryption processing of a binary digital image per a field unit or frame according to the mode information on the block concerned of a digital color picture in case the binary digital image which shows the significant configuration of a digital color picture and said color picture from the image coded signal encoded with image coding equipment according to claim 13 is decrypted.

[Claim 15] In case it encodes for every binary digital image block which shows the significant configuration of a digital color picture and said color picture A mode judging means to judge for every block whether coding processing of a binary digital image is performed per field, or it carries out per frame, and to output mode information, A binary digital image coding means to perform coding processing of the block of a digital color picture concerned per a field unit or frame according to said mode information, Image coding equipment according to claim 1 characterized by providing a digital color picture coding means to perform coding processing of the block of a multiple-value digital image concerned per a field unit or frame according to said mode information.

[Claim 16] In case the binary digital image which shows the significant configuration of a digital color picture and said color picture from the image

coded signal encoded with image coding equipment according to claim 15 is decrypted The binary digital image decryption means which decrypts a binary digital image per a field unit or frame for every block according to mode information, Image decryption equipment according to claim 2 characterized by providing a digital color picture decryption means to perform a decryption of the digital color picture of the block concerned per a field unit or frame according to said mode information.

[Claim 17] The image coding equipment characterized by to provide the process which encodes said binary digital image per field, the process which encode said binary digital image per frame, and the process which judge for every block in the magnitude of the amount of signs which encoded the result of coding processing per the field unit and frame, and output a coded signal in the image coding approach which divides a binary digital image into the two-dimensional block which consists of two or more pixels, and encodes for every block.

[Claim 18] The image decryption approach characterized by providing the process which performs decryption processing per a field unit or frame for every block in the image decryption approach decrypted to a binary digital image according to mode information from the image coded signal encoded by the image coding approach according to claim 17.

[Claim 19] The record medium which is a record medium of a computer and is recording the program which realizes at least one of claim 1 to the claims 18.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the record medium with which the computer program for software to realize the image coding equipment / image decryption equipment, the image coding approach / the image decryption approach, and it which encode / decrypt a digital image was recorded.

[0002]

[Description of the Prior Art] There are ITU-T H.262 as standard advice of the approach of encoding / decrypting a digital image with the present interlace structure, and television signals, such as NTSC, can be encoded / decrypted efficiently.

[0003] Moreover, in case a digital image is encoded / decrypted, the method of performing coding/decryptions not only including the luminance signal and color-difference-signal value of a pixel but the configuration information signal

showing an objective configuration is adopted as a valuation modeling of ISO/IEC MPEG4 (ISO/IEC JTC/SC29/WG11 N1469 November 1996).

[0004] By this approach, there is the description it not only can perform effective reduction of the amount of signs, but that it can perform composition of an image etc. easily according to configuration information, by performing coding/decryption of a luminance signal and a color-difference signal only about the significant pixel shown using configuration information.

[0005]

[Problem(s) to be Solved by the Invention] It is not taken into consideration about an image with the interlace structure where one frame is constituted from a valuation modeling of MPEG4 shown above by the two fields. Therefore, efficient coding/decryption cannot be performed to an input image with interlace structure.

[0006] Moreover, although taken into consideration in H.262 about the motion compensation approach and discrete cosine transform which took interlace structure into consideration about the luminance signal and the color-difference signal Since the special approach which is not taken into consideration in H.262, such as a down sampling, a rise sampling, and prediction of a pixel value-change location, is used as the coding approach of a binary picture which shows a significant configuration, H. Coding/decryption means corresponding to

the interlace structure adopted by 262 is not simply employable.

[0007] In case this invention is set to such image coding equipment / image decryption equipment and encodes / decrypts an input image, it aims at improving coding effectiveness by choosing accommodative whether it encodes/decrypts per field for every block also about a configuration information image, or it encodes/decrypts per frame.

[0008]

[Means for Solving the Problem] In order to solve this technical problem, this invention considers a binary digital image with the interlace structure where one frame was constituted by the two fields as an input. In the image coding equipment which divides said image into the two-dimensional block which consists of two or more pixels, and encodes for every block A mode judging means to judge the approach of performing coding processing per field, and the approach of performing per frame for every block, and to output mode information, It constitutes from a coding means which encodes per a field unit or frame for every block according to said mode information.

[0009] Moreover, it is made to constitute from a decryption means to perform decryption processing per a field unit or frame for every block according to mode information in the image decryption equipment which decrypts a binary digital image with the interlace structure where one frame was constituted by the two

fields, for every two-dimensional block which consisted of two or more pixels from the image coded signal encoded with the above-mentioned image coding equipment.

[0010] Efficient image coding equipment / image decryption equipment are realizable by this choosing accommodative whether it encodes/decrypts per field for every block, or it encodes/decrypts per frame.

[0011]

[Embodiment of the Invention] Invention of this invention according to claim 1 has an operation that improvement in coding effectiveness can be attained, in the image coding equipment which divides a binary digital image into the block which consisted of two or more pixels, and encodes for every block by judging the direction with sufficient any of field unit-signal-ized processing and frame unit-signal-ized processing or coding effectiveness for every block.

[0012] Invention according to claim 2 has an operation that it can decrypt correctly, by changing field unit decryption processing and frame unit decryption processing from an image coded signal for every block using mode information in the image decryption equipment decrypted to a binary digital image.

[0013] In case invention according to claim 3 encodes a binary digital image, it has an operation that improvement in coding effectiveness can be aimed at, by judging the direction with sufficient any of field unit down sampling processing

and frame unit down sampling processing or effectiveness for every block.

[0014] In case invention according to claim 4 decodes a binary digital image, it has an operation that it can decrypt correctly, by changing field unit down sampling processing and frame unit down sampling processing for every block using mode information.

[0015] In case invention according to claim 5 encodes a binary digital image, it has an operation that improvement in coding effectiveness can be aimed at, by judging the direction with sufficient any of a field unit motion compensation and a frame unit motion compensation or effectiveness for every block.

[0016] In case invention according to claim 6 decodes a binary digital image, it has an operation that it can decrypt correctly, by changing a field unit motion compensation and a frame unit motion compensation for every block using mode information.

[0017] the image coding equipment which encodes the physical relationship of a view pixel and the pixel from which a pixel value changes in case invention according to claim 7 encodes a binary digital image -- setting -- detection of a pixel value-change point -- a field unit or a frame unit -- it has an operation that improvement in coding effectiveness can be attained, by judging the more efficient one for every block and performing it.

[0018] Invention according to claim 8 has an operation that it can decrypt

correctly, by changing using mode information whether the location of a pixel where a pixel value changes from the physical relationship of the pixel to which its attention is paid, and the pixel from which a pixel value changes in the image decryption equipment which decodes a binary digital image is calculated per field, or it carries out per frame for every block.

[0019] In the image coding equipment which it determines the probability distribution of the pixel value of a view pixel from the distribution condition of the pixel value of a surrounding pixel in case invention according to claim 9 encodes a binary digital image, and encodes the pixel value of a view pixel according to the probability distribution investigation of the distribution condition of the circumference pixel value for determining probability distribution -- a field unit or a frame unit -- by judging the more efficient one for every block and performing it, it has an operation that improvement in coding effectiveness can be attained.

[0020] Invention according to claim 10 has an operation that it can decrypt correctly, by changing using mode information whether the distribution condition of the circumference pixel value for determining the probability distribution of the pixel value of a view pixel from the distribution condition of the pixel value of a surrounding pixel, and determining probability distribution in the image decryption equipment which decrypts a pixel value according to the probability distribution is investigated per field, or it carries out per frame for every block.

[0021] In the image coding equipment which invention according to claim 11 determines the probability distribution of the pixel value of a view pixel from the distribution condition of the pixel value of a motion compensation prediction image, and encodes the pixel value of a view pixel according to the probability distribution investigation of the distribution condition of the pixel value of the motion compensation prediction image for determining probability distribution -- a field unit or a frame unit -- by judging the more efficient one for every block and performing it, it has an operation that improvement in coding effectiveness can be attained.

[0022] In the image decryption equipment which invention according to claim 12 determines the probability distribution of the pixel value of a view pixel from the distribution condition of the pixel value of a motion compensation prediction image, and decrypts a pixel value according to the probability distribution By changing for every block whether the distribution condition of the pixel value of the motion compensation prediction image for determining probability distribution is investigated per field, or it carries out per frame according to mode information, it has an operation that it can decrypt correctly.

[0023] In case invention according to claim 13 encodes a binary digital image and a multiple-value digital image for every block, by being subordinate to the mode information on the multiple-value digital image of the block concerned, and

performing selection of whether to perform coding processing of a binary digital image in a field unit or a frame unit, it does not need to use a sign special about the mode information on a binary digital image, and has an operation that improvement in coding effectiveness can be attained.

[0024] In case invention according to claim 14 decrypts a binary digital image and a multiple-value digital image for every block from an image coded signal, it has an operation that it can decrypt correctly, by being subordinate to the mode information on the multiple-value digital image of the block concerned, and performing the sign of a binary digital image, or the judgment of whether to perform processing in a field unit or a frame unit, without using a sign special about the mode information on a binary digital image.

[0025] In case invention according to claim 15 encodes a binary digital image and a multiple-value digital image for every block By judging field unit-signal-ized processing or frame unit-signal-ized processing as coding processing of a binary digital image, and making the judged mode information reflect in the judgment of the mode information on the multiple-value digital image of the block concerned It is not necessary to use a sign special about the mode information on a multiple-value digital image, and has an operation that improvement in coding effectiveness can be attained.

[0026] In case invention according to claim 16 decrypts a binary digital image

and a multiple-value digital image for every block from an image coded signal, it has an operation that it can decrypt correctly, by making the mode information on a binary digital image reflect in selection of the mode information on the multiple-value digital image of the block concerned, without using a sign special about the mode information on a multiple-value digital image.

[0027] In the image coding approach which invention according to claim 17 divides a binary digital image into the two-dimensional block which consists of two or more pixels, and encodes for every block The process which encodes said binary digital image per field, and the process which encodes said binary digital image per frame, The result of coding processing is judged for every block in the magnitude of the amount of signs encoded per the field unit and frame. It has an operation that improvement in coding effectiveness can be attained, from providing the process which outputs a coded signal by judging the direction with sufficient any of field unit-signal-ized processing and frame unit-signal-ized processing or coding effectiveness for every block.

[0028] Invention according to claim 18 has an operation that it can decrypt correctly, by changing field unit decryption processing and frame unit decryption processing for every block using mode information by providing the process which performs decryption processing per a field unit or frame for every block in the image decryption approach decrypted to a binary digital image according to

mode information from the image coded signal encoded by the image coding approach according to claim 17.

[0029] Invention according to claim 19 has an operation that it is easily realizable by the independent computer system, by recording on the record medium of the computer by which the program which realizes at least 1 ** to claims 1-18 of this invention is recorded, and transporting.

[0030] Hereafter, the gestalt of operation of this invention is explained using drawing 31 from drawing 1 .

(Gestalt 1 of operation) Drawing 1 is the block diagram of the image coding equipment in the gestalt 1 of operation of this invention. A change means by which 12 changes an output signal in this drawing, a multiplexing means by which 13 multiplexes mode information and a coded-image signal, A frame coding means to encode 16 per frame, a field coding means to encode 17 per field, A field change location detection means by which 61 detects the changing point that a pixel value changes, per field, A frame change location detection means by which 62 detects the changing point that a pixel value changes, per frame, A change location prediction means by which 63 predicts a changing point from the changing point of a pixel [finishing / coding], the memory holding the change location where 64 was detected, and the difference which asks for the difference of the change location where 65 was predicted to be the detected

change location -- a count means -- 66 -- difference -- a coding means to encode a value, and 67 -- the difference in a field unit -- the difference in the coded-image signal and frame unit based on a value -- a mode judging means to compare the coded-image signal based on a value, and to judge the mode information on a field unit or a frame unit is shown.

[0031] Moreover, drawing 4 (a) shows the example of the block for coding which consisted of 8x8 pixels, and the pixel [finishing / coding] to which the upper reference pixel in this drawing already belongs to the lowest line of the block top next door block for coding, and a left reference pixel are pixels [finishing / coding] which already belong to the rightmost train of the block left-hand block for coding. In the pixel I of this block for coding (x y), as for odd pixels, y belongs to the 1st field, and, as for even pixels, y belongs to the 2nd field.

[0032] About the image coding equipment constituted as mentioned above, the actuation is explained below. First, the fundamental view of this invention is explained. For every block illustrated to drawing 4 (a), as an input picture signal 141, the binary digital image divided into the two-dimensional block which consisted of two or more pixels is inputted into the frame coding means 16 and the field coding means 17, and performs coding processing with the block division means which is not shown all over drawing, respectively. The mode judging means 67 compares the amount of signs of the coded-image signal from

the frame coding means 16 and the field coding means 17, the coded-image signal of the direction with few amounts of signs is changed, and it chooses with a means 12. The multiplexing means 13 outputs the mode information 149 and the coded-image signal 142 as a bit stream signal 14 by multiplexing.

[0033] Thereby, improvement in sign coding effectiveness can be aimed at by choosing the direction with sufficient any of field unit-signal-ized processing and frame unit-signal-ized processing or coding effectiveness according to a motion of a dynamic image.

[0034] Next, how to encode based on the location where a pixel value changes for a coding means is explained. The binary digital image divided into the two-dimensional block which consisted of two or more pixels with the block division means which is not shown all over drawing is inputted into the field change location detection means 61 and the frame change location detection means 62 as an input picture signal 141 for every block illustrated to drawing 4 (a).

[0035] With the field change location detection means 61, a pixel is horizontally scanned from the view pixel [finishing / signal / which was inputted / coding / already] A, the location of a pixel on the left and the pixel which changes to a different pixel value is detected in the same field, and it outputs as a field change location 145. That is, in the example of drawing 4 (a), Pixel B serves as a field

change location. In the case of a field unit, this is for scanning at intervals of a line.

[0036] With the frame change location detection means 62, a pixel is horizontally scanned from the view pixel [finishing / signal / which was inputted / coding / already] A, the location of a pixel on the left and the pixel which changes to a different pixel value is detected within a frame, and it outputs as a frame change location 146. That is, in the example of drawing 4 (a), Pixel C serves as a frame change location.

[0037] With the change location prediction means 63, the location where a pixel value changes next from the location where the pixel value of a pixel [finishing / coding / already] changes is predicted, and it outputs as a prediction change location. The pixel which changes from a black pixel to a white pixel like Pixel A in a pixel [finishing / coding / already] in the example of drawing 4 (a) is Pixel D in the same field, and is Pixel E within a frame. Therefore, since the difference of the x-coordinate of Pixel D and Pixel A is 0, a field prediction change location serves as Pixel B, and since the difference of the x-coordinate of Pixel E and Pixel A is 1, Pixel F serves as a frame prediction change location.

[0038] difference -- difference with the change location predicted in the count means 65 with the change location and the change location prediction means 63 which were detected with the change location detection means -- a value is

calculated. the difference of Example B of drawing 4 (a), i.e., a field change detection location, and the field change prediction location B -- a value 0 -- the field -- difference -- it outputs as a value 147 -- having -- the difference of the frame change detection location C and the frame change prediction location F -- a value -3 -- a frame -- difference -- it is outputted as a value 148.

[0039] the coding means 66 -- difference -- the difference calculated with the count means 65 -- it encodes using the Huffman-coding table which was able to define the value beforehand. With the mode judging means 67, the amount of signs of the coded-image signal searched for per field and the coded-image signal searched for per frame is measured, the mode with sufficient coding effectiveness is judged, and it outputs as mode information 149. With the change means 12, according to the mode information 149, either a field unit-signal-ized picture signal or a frame unit-signal-ized picture signal is chosen, and it outputs as a coded-image signal 142. The multiplexing means 13 multiplexes the coded-image signal 142 which changed to the mode information 149 from the mode judging means 67, and was chosen with the means 12, and outputs it as a bit stream signal 14.

[0040] According to the gestalt of this operation explained by the above, in case it encodes based on the location where a pixel value changes the image to a binary digital image with interlace structure Improvement in coding effectiveness

can be attained by judging and changing the direction with sufficient any of the technique which detects a pixel value-change location per the technique which detects a pixel value-change location per field, and is encoded, and frame, and is encoded or effectiveness for every block with the mode judging means 67.

[0041] (Gestalt 2 of operation) Drawing 2 is the block diagram of the image decryption equipment in the gestalt 2 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 1 of the operation shown in drawing 1 is attached, and explanation is omitted.

[0042] A change means by which 11 changes the output destination change of a signal in this drawing, a demultiplexing means by which 15 divides the bit stream signal 14 into the mode information 149 and the coded-image signal 142 by demultiplexing, 70 -- the difference from a coded-image signal -- a decryption means to decrypt a value, and 71 -- difference -- the difference which asks for the location where the prediction location of a pixel where a value and a pixel value change is added, and a pixel value changes -- a value addition means -- A frame binary picture decode means by which a field binary picture decode means 73 by which 72 decrypts a binary picture in a field unit from a pixel value-change location decrypts a binary picture in a frame unit from a pixel value-change location, 151 -- difference -- a value signal, the binary digital image signal with which a pixel value-change location and 153 were decrypted for 152,

and 154 show the prediction location of a pixel value-change location.

[0043] About the image decryption equipment constituted as mentioned above, the actuation is explained below. The demultiplexing means 15 divides the bit stream signal 14 into the mode information 149 and the coded-image signal 142 by demultiplexing. difference with the prediction location of the location which carries out pixel value change from the coded-image signal 142 with the decryption means 70, and the changing location -- a value -- decrypting -- difference -- a value 151 is outputted.

[0044] With the change location prediction means 63, the location where a pixel value changes next from the location where the pixel value of the pixel already decrypted changes is predicted, and the prediction change location 154 is outputted. The prediction change location pixel B is obtained from the difference 0 of the x-coordinate of Pixel A and Pixel C from the pixel [finishing / a decryption / already] C which belongs to the same field as the view pixel A and Pixel A in the block for a decryption illustrated to drawing 4 (b), and changes from a black pixel to a white pixel similarly. In the block for a decryption illustrated to drawing 5 , the prediction change location pixel F is obtained from the view pixel E, Pixel E, and the pixel [finishing / a decryption / already] G that changes from a black pixel to a white pixel similarly.

[0045] difference -- the value addition means 71 -- difference -- the pixel value

change location 152 is outputted in quest of the sum of a value and a prediction change location. namely, difference -- when a value is -1, in the block illustrated to drawing 4 (a), Pixel D is a pixel value change location, and Pixel H serves as a pixel value change location in the block illustrated to drawing 5 .

[0046] With the change means 11, the pixel value change location 152 is inputted into either the field binary picture decryption means 72 or the frame binary picture decryption means 73 according to the mode information 149.

[0047] With the field binary picture decryption means 72, the pixel between a view pixel location and a pixel value change location is set as the same pixel value as a pixel value on the left one by one, a binary digital image is decrypted, and the decryption image shown in drawing 4 (c) is obtained. A block double sign-ized image is obtained by doing the same activity from an upper left pixel to a lower right pixel in order of the field 1 and the field 2.

[0048] With the frame binary picture decryption means 73, the pixel between a view pixel location and a pixel value change location is set as the same pixel value as a pixel value on the left one by one with the frame structure, and the decryption image which decrypted the binary digital image and was shown in drawing 6 is obtained. A block double sign-ized image is obtained by doing the same activity from an upper left pixel to a lower right pixel.

[0049] With the change means 12, according to the mode information 149, either

the output of the field binary picture decryption means 72 or the output of the frame binary picture decryption means 73 is chosen, and it outputs as a binary digital decryption picture signal 153.

[0050] According to the gestalt of this operation explained by the above, it can decrypt correctly by using the mode information 149 and the change means 11 and 12 to the coded-image signal encoded based on the location where the pixel value with interlace structure of a binary digital image changes.

[0051] In addition, although the change means 11 of an output destination change and the change means 12 of an inputting agency are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0052] Moreover, in drawing 4 , drawing 5 , and drawing 6 , although the 8x8-pixel block was shown, it can carry out similarly about the block which consisted of mxn pixels of arbitration.

[0053] (Gestalt 3 of operation) Drawing 3 is the block diagram of the image decryption equipment in the gestalt 3 of operation of this invention. In this drawing, the number same about the same means and same signal as the gestalt 1 of operation shown in drawing 1 and the gestalt 2 of the operation shown in drawing 2 is attached, and explanation is omitted.

[0054] In this drawing, a binary picture decryption means to restore a binary

picture from the location which carries out the pixel value change of 76, the field / frame rearrangement means which 77 rearranges the block image of field structure into the frame structure, and 157 show the decrypted binary block picture signal.

[0055] About the image decryption equipment constituted as mentioned above, the actuation is explained below. The demultiplexing means 15 divides the bit stream signal 14 into the mode information 149 and the coded-image signal 142 by demultiplexing. the decryption means 70 -- the coded-image signal 142 -- difference -- a value 151 is decrypted.

[0056] With the change location prediction means 63, the location where a pixel value changes next from the location where the pixel value of a binary picture [finishing / a decryption / already] changes is predicted, and the prediction change location 154 is outputted. difference -- the value addition means 71 -- difference -- the pixel value change location 152 is outputted in quest of the sum of a value 151 and the prediction change location 154.

[0057] With the binary picture decryption means 76, a binary picture is decrypted by setting the pixel value of a view pixel [finishing / a decryption] and the pixel between the pixel change locations 152 as the same pixel value as a pixel on the left.

[0058] With the change means 11, when the mode information 149 shows field

mode, an image is inputted into the field / frame rearrangement means 77, and when the mode information 149 shows the frame mode, the field / frame rearrangement means 77 is skipped.

[0059] With the field / frame rearrangement means 77, it changes into the frame structure with which the pixel belonging to the two fields shown in drawing 7 (b) is located in a line by turns for every Rhine by rearranging the field structure block which has the structure where the two fields shown in drawing 7 (a) continue for every Rhine.

[0060] With the switch means 12, either of the signals which have skipped the output of the field / frame rearrangement means 77, or the field / frame rearrangement means 77 according to the mode information 149 is chosen, and the binary digital decryption picture signal 153 is outputted.

[0061] According to the gestalt of this operation explained by the above, a binary digital image can be correctly decrypted by choosing whether to the coded-image signal encoded based on the location where the pixel value with interlace structure of a binary digital image changes, after decrypting a binary digital block image, according to the mode information 149, it rearranges and outputs to the frame structure from field structure, or it outputs as it is.

[0062] In addition, although the output destination change change means 11 and the inputting agency change means 12 are used with the gestalt of this operation,

the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0063] Moreover, in drawing 7 (a) and drawing 7 (b), although the 8x8-pixel block was shown, it can carry out similarly about the block which consisted of mxn pixels of arbitration.

[0064] (Gestalt 4 of operation) Drawing 8 is the block diagram of the image coding equipment in the gestalt 4 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 2 of the operation shown in the gestalt 1 and drawing 2 of operation which are shown in drawing 1 is attached, and explanation is omitted. This drawing is shown in a field down sample means by which 31 carries out the down sampling of the binary digital block image per field, a frame down sample means by which 32 carries out the down sampling of the binary digital block image per frame, a coding means to encode the image with which the down sampling of 33 was carried out, and a mode judging means for 34 to judge mode information and to output mode information.

[0065] About the image coding equipment constituted as mentioned above, the actuation is explained below. The binary digital image divided into the two-dimensional block which consisted of two or more pixels with the block division means which is not shown all over drawing is inputted into the mode

judging means 34 and the change means 11 as an input picture signal 110 for every block.

[0066] With the mode judging means 34, it judges whether it processes by the field unit down sampling 31 using a variance or the correlation value between Rhine, or it processes by the frame unit down sampling 32, and outputs as mode information 111. In the example of a mode judging of whether it processes in the field unit using correlation between Rhine, or to process per frame, EXCLUSIVE OR operation of a pixel value is performed for every Rhine which adjoins per a field unit and frame, and the direction with few pixel values of an inequality is chosen. For example, although the case where adjoining Rhine is judged per frame is shown in drawing 11 (a) and the case where adjoining Rhine is judged per field is shown in drawing 11 (b) as shown in drawing 11 when judging the block shown in drawing 10 (a) It turns out that it is more advantageous for "1" to have shown to the inequality pixel, to have set total of each inequality pixel to "7" and "3", and to perform down sample processing per field. In addition, the number of Hidari of drawing 11 shows the line number of drawing 10 (a).

[0067] With the change means 11, the input-block picture signal 110 is inputted into the field down sample means 31 or the frame down sample means 32 according to the mode information 111.

[0068] With the field down sample means 31, the down sampling of the inputted

block image is carried out for every field, and it outputs as a field down sampling image 112. For example, when setting to one half the input picture signal shown in drawing 10 (a), if it determines whether to set the pixel of 2x2 to whether it is referred to as "1" by the number of "1", and "0" and it carries out a down sampling per field, it will become like drawing 10 (c). With the frame down sample means 31, the down sampling of the inputted block image is carried out with the frame structure, and it outputs as a frame down sampling image 113. For example, when setting to one half the input picture signal shown in drawing 10 (a), if it determines whether to set the pixel of 2x2 to whether it is referred to as "1" by the number of "1", and "0" and it carries out a down sampling per frame, it will become like drawing 10 (b).

[0069] The change means 12 chooses either the field down sampling image 112 or the frame down sampling image 113 according to the mode information 111, and inputs it into the coding means 33. With the coding means 33, the inputted binary block image is encoded and the coded-image signal 114 is outputted. The multiplexing means 13 multiplexes the coded-image signal 114 from the mode information 111 and the coding means 33, and outputs the bit stream signal 14.

[0070] According to the gestalt of this operation explained by the above, improvement in coding effectiveness can be attained by choosing technique with sufficient any of a down sampling in a field unit, or a down sampling in a frame

unit or effectiveness with the mode judging means 34 to a binary digital image with interlace structure.

[0071] In addition, although the output destination change change means 11 and the inputting agency change means 12 are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0072] (Gestalt 5 of operation) Drawing 9 is the block diagram of the image decryption equipment in the gestalt 5 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 4 of the operation shown in the gestalt 1 of operation shown in drawing 1 , the gestalt 2 of the operation shown in drawing 2 , and drawing 11 is attached, and explanation is omitted. In this drawing, a decryption means by which 36 decrypts a binary block image from an image coded signal, a field rise sample means by which 37 carries out the rise sampling of the binary block image per field, and 38 show the frame-up sample means which carries out the rise sampling of the binary block image per frame.

[0073] About the image decryption equipment constituted as mentioned above, the actuation is explained below. The demultiplexing means 15 divides the bit stream signal 14 into the mode information 111 and the coded-image signal 114 by demultiplexing. The decryption means 36 decrypts a block image from the

image coded signal 114, and outputs the binary block decryption picture signal 116.

[0074] The change means 11 inputs the binary block decryption picture signal 116 into either the field rise sample means 37 or the frame-up sample means 38 according to the mode information 111.

[0075] With the field rise sample means 37, the rise sampling of the block image is carried out for every field, and a binary block decryption image is outputted.

[0076] With the frame-up sample means 38, the rise sampling of the block image is carried out with the frame structure, and a binary block decryption image is outputted.

[0077] With the change means 12, according to the mode information 111, either the output of the field rise sample means 37 or the output of the frame-up sample means 38 is chosen, and the binary digital decryption picture signal 117 is outputted.

[0078] According to the gestalt of this operation explained by the above, the binary digital image which has NTARESU structure surely can be decrypted to the coded-image signal which performed the down sampling in consideration of interlace structure by using the mode information 111, the change means 11, and the change means 12.

[0079] In addition, although the output destination change change means 11 and

the inputting agency change means 12 are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0080] (Gestalt 6 of operation) Drawing 12 is the block diagram of the image decryption equipment in the gestalt 6 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 4 of the operation shown in the gestalt 1 of operation shown in drawing 1 , the gestalt 2 of the operation shown in drawing 2 , and drawing 11 is attached, and explanation is omitted. In this drawing, a decryption means by which 47 decrypts a binary block image from a coded-image signal, a rise sample means by which 47 carries out the rise sampling of the block image, and 48 show the field / frame rearrangement means which rearranges a block image into the frame structure from field structure.

[0081] About the image decryption equipment constituted as mentioned above, the actuation is explained below. The demultiplexing means 15 divides the bit stream signal 14 into the mode information 111 and the coded-image signal 114 by demultiplexing. The decryption means 46 decrypts a block image from the coded-image signal 114, and outputs the binary block decryption picture signal 126.

[0082] The rise sample means 47 performs the rise sample of the block

decryption picture signal 126.

[0083] The change means 11 inputs into the field / frame rearrangement means 48 the image by which the rise sample was carried out, when the mode information 111 shows field mode, and when the mode information 111 shows the frame mode, it skips the field / frame rearrangement means 48 for an image.

[0084] With the field / frame rearrangement means 48, it changes into the frame structure with which the pixel belonging to the two fields shown in drawing 7 (b) is located in a line by turns for every Rhine by rearranging the field structure block with which the two fields shown in drawing 7 (a) have structure which continues respectively for every Rhine.

[0085] The change means 12 chooses either of the signals which have skipped the output of the field / frame rearrangement means 48, or the field / frame rearrangement means 48 according to the mode information 111, and outputs the binary digital decryption picture signal 128.

[0086] According to the gestalt of this operation explained by the above, the binary digital image which has NTARESU structure surely can be decrypted to the coded-image signal which performed the down sampling in consideration of interlace structure by using the mode information 111, the change means 11, the change means 12, and the field / frame rearrangement means 48.

[0087] (Gestalt 7 of operation) Drawing 13 is the block diagram of the image

coding equipment in the gestalt 7 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 1 of the operation shown in drawing 1 is attached, and explanation is omitted.

[0088] A mode judging means for 51 to judge the field/frame mode and to output mode information in this drawing, A coding means by which 52 encodes a binary digital image, a field motion compensation means by which 53 performs a motion compensation per field, A frame motion compensation means by which 54 performs a motion compensation per frame, the memory holding the image, with which 56 was decrypted, A decryption means by which 57 decrypts a binary digital image from a coded-image signal, a field motion presumption means to presume by 58 moving per field, and a frame motion presumption means to presume by 59 moving per frame are shown.

[0089] About the image coding equipment constituted as mentioned above, the actuation is explained below. The binary digital image divided into the two-dimensional block which consisted of two or more pixels by the block division means which is not shown all over drawing is inputted into the mode judging means 51 and the coding means 52 as an input picture signal 131 for every block.

[0090] With the field motion presumption means 58, it presumes by moving for every field from the input picture signal 131 and the reference picture signal 136,

and the field motion vector 138 is outputted. With the frame motion presumption means 59, motion presumption is performed from the input picture signal 131 and the reference picture signal 136 with the frame structure, and the frame motion vector 139 is outputted.

[0091] It moves to drawing 15 , the conceptual diagram of presumed processing is shown, and it explains below. The detection block 212 which performed block matching and agreed most is detected scanning the input image block 213 which is the input picture signal 131 about the inside of the reference image block 210 which is the reference picture signal 136 from memory 56, and it asks for the motion vector 211 which is the coordinate difference of the detection block 212 and the input image block 213. Since an object is a binary digital image, block matching carries out the sequential scan of the inside of the reference image block 210, and total of a coincidence pixel detects the largest location as detection block 212 by the EXCLUSIVE OR operation of each pixel value of the input image block 213.

[0092] With the field motion compensation means 53, a motion compensation is performed for every field using the reference picture signal 136 and the field motion vector 138, and the field prediction image 134 is outputted. With the frame motion compensation means 54, motion presumption / motion compensation is performed from the reference picture signal 136 and the frame

motion vector 139 with the frame structure, and the frame prediction picture signal 135 is outputted.

[0093] With the mode judging means 51, the field prediction picture signal 134 is compared with the frame prediction picture signal 135, the mode whose motion compensation prediction error decreases more is judged, and it outputs as mode information 133. With the change means 12 (a), according to the mode information 133, either the field prediction picture signal 134 or the frame prediction picture signal 135 is chosen, and it inputs into the coding means 52 and the decryption means 57.

[0094] With the coding means 52, the input picture signal 131 is encoded using a prediction picture signal and the mode information 133, and the coded-image signal 132 is outputted. The multiplexing means 13 multiplexes the mode information 133, the coded-image signal 132, and a motion vector 140, and outputs the bit stream signal 14.

[0095] With the decryption means 57, a binary digital image is decrypted using a coded-image signal, a prediction picture signal, and the mode information 133, and the decryption picture signal 137 is outputted. Memory 56 holds the decryption picture signal 137, and outputs the reference picture signal 136. With the change means 12 (b), according to the mode information 133, either the field motion vector 138 or the frame motion vector 139 is chosen, and it outputs as a

motion vector signal 140.

[0096] According to the gestalt of this operation explained by the above, improvement in coding effectiveness can be attained by choosing the motion compensation means whose motion compensation prediction error decreases more with the mode judging means 51 to a binary digital image with interlace structure.

[0097] (Gestalt 8 of operation) Drawing 14 is the block diagram of the image decryption equipment in the gestalt 8 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 7 of the operation shown in the gestalt 1 of operation shown in drawing 1 , the gestalt 2 of the operation shown in drawing 2 , and drawing 14 is attached, and explanation is omitted.

[0098] About the image decryption equipment constituted as mentioned above, the actuation is explained below. From the bit stream signal 14, it dissociates, respectively and the demultiplexing means 15 outputs the mode information 133, the coded-image signal 132, and each signal of a motion vector 140. The reference picture signal 136 is inputted into either the field motion compensation means 53 or the frame motion compensation means 54 according to the mode information 133 by the change means 11 (b). The motion vector signal 140 is inputted into either the field motion compensation means 53 or the frame motion

compensation means 54 according to the mode information 133 by the change means 11 (a).

[0099] The field motion compensation means 53 performs a motion compensation for every field using the reference picture signal 136 and the motion vector signal 140, and outputs the field prediction picture signal 134. The frame motion compensation means 54 performs a motion compensation using the reference picture signal 136 and the motion vector signal 140 with the frame structure, and outputs the frame prediction picture signal 135.

[0100] With the change means 12, according to the mode information 133, either the field prediction picture signal 134 or the frame prediction picture signal 135 is chosen, and it inputs into the decryption means 57. With the decryption means 57, the coded-image signal 132 is decrypted using the mode information 133 and a prediction picture signal, and the binary digital decryption picture signal 137 is outputted. Memory 56 holds the decryption picture signal 137, and outputs the reference picture signal 136.

[0101] According to the gestalt 8 of this operation explained by the above, the binary digital image which has interlace structure surely can be decrypted to the coded-image signal which performed the motion compensation in consideration of interlace structure, and encoded the remainder by using the mode information 133 and the change means 11 (a), 11 (b), and 12.

[0102] In addition, with the gestalt of this operation, although the output destination change change means 11 (a), and 11 (b) and the inputting agency change means 12 are used, even if it uses either the change means 11 (a), 11 (b) or the change means 12, the same effectiveness can be acquired.

[0103] (Gestalt 9 of operation) Drawing 16 is the block diagram of the image coding equipment in the gestalt 9 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 2 of the operation shown in the gestalt 1 and drawing 2 of operation which are shown in drawing 1 is attached, and explanation is omitted.

[0104] In this drawing, a mode judging means judge for every block whether 81 is encoded per whether it encodes in a field unit from a color picture signal and frame, a color-picture field coding means to by_which 82 encodes a colour block image per field, a color-picture frame coding means to by_which 83 encodes a colour block image per frame, a binary picture field coding means to by_which 84 encodes a binary block image per field, and 85 show a binary picture frame coding means encode a binary block image per frame.

[0105] About the image coding equipment constituted as mentioned above, the actuation is explained below. By the block division means which is not shown all over drawing, a color digital image is divided into the two-dimensional block which consisted of two or more pixels, and is inputted into the mode judging

means 81 and the change means 11 (a) as a colour block image 161.

[0106] The mode judging means 81 chooses either the formation of a field unit signal, or the formation of a frame unit signal from the inputted colour block image 161 using distribution, correlation, etc. of a pixel value, and outputs it as mode information 163.

[0107] The change means 11 (a) inputs the colour block image 161 into either the color picture field coding means 82 or the color picture frame coding means 83 according to the mode information 163. Moreover, the change means 11 (c) inputs the mode information 163 into either the color picture field coding means 82 or the color picture frame coding means 83 according to the mode information 163.

[0108] With the color picture field coding means 82, the mode information 163 is encoded first, and then the colour block picture signal 161 is encoded and outputted for every field. With the color picture frame coding means 83, the mode information 163 is encoded first, next, it encodes with the frame structure and the colour block picture signal 161 is outputted. With the change means 12 (a), according to the mode information 163, the output of the color picture field coding means 82 or the output of the color picture frame coding means 83 is chosen, and it outputs as a coding color picture signal 164.

[0109] The change means 11 (b) inputs into either the binary field coding means

84 or the binary frame coding means 85 the binary block image 162 divided into the two-dimensional block which consisted of two or more pixels with the block division means which is not shown all over drawing according to the mode information 163.

[0110] The binary picture field coding means 84 encodes and outputs the binary block image 164 for every field. The binary picture frame coding means 85 encodes with the frame structure, and outputs the binary block image 162.

[0111] The change means 12 (b) chooses the output of the binary picture field coding means 84, or the output of the binary picture frame coding means 85 according to the mode information 163, and outputs it as a coding binary picture signal 165. The multiplexing means 13 multiplexes the coding color picture signal 164 and the coding binary picture signal 165, and outputs them as a bit stream signal 14.

[0112] It is not necessary to encode the mode information on a binary digital image, and, according to the gestalt of this operation explained by the above, improvement in coding effectiveness can be attained to a color digital image signal and a binary digital image signal with interlace structure by encoding a binary digital image according to the mode information on a color digital image.

[0113] In addition, with the gestalt of this operation, although the change means 12 (a) of change means [of an output destination change] 11 (a), 11 (b) and 11

(c), and input origin and 12 (b) are used, even if it uses either the change means 11 or the change means 12, the same effectiveness can be acquired.

[0114] (Gestalt 10 of operation) Drawing 17 is the block diagram of the image decryption equipment in the gestalt 10 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 9 of the operation shown in the gestalt 1 of operation shown in drawing 1 , the gestalt 2 of the operation shown in drawing 2 , and drawing 16 is attached, and explanation is omitted. A mode decryption judging means by which 88 decrypts the mode information 163 on coding from the coding color picture signal 164 in this drawing, A color picture field decryption means by which 89 decrypts a colour block image in a field unit from the coding color picture signal 164, A color picture frame decryption means by which 90 decrypts a colour block image from the coding color picture signal 164 with the frame structure, A binary picture field decryption means by which 91 decrypts a binary block image in a field unit from the coding binary picture signal 165, and 92 show a binary picture frame decryption means to decrypt a binary block image in a frame unit from the coding binary picture signal 165.

[0115] About the image decryption equipment constituted as mentioned above, the actuation is explained below. The demultiplexing means 15 separates and outputs the coding color picture signal 164 and the coding binary picture signal

165 from the bit stream signal 14. The mode decryption judging means 88 decrypts the mode information 163 on the separated color picture while it separates the mode information encoded from the coding color picture signal 164 and outputs the coding color picture signal 164.

[0116] The change means 11 (a) inputs the coding color picture signal 164 into either the color picture field decryption means 89 or the color picture frame decryption means 90 according to the mode information 163.

[0117] The color picture field decryption means 89 decrypts a colour block image in a field unit from the coding color picture signal 164. The color picture frame decryption means 90 decrypts a colour block image from the coding color picture signal 164 with the frame structure.

[0118] According to the mode information 163, the change means 12 (a) chooses either the output of the color picture field coding means 89, or the output of the color picture frame coding means 90, and outputs it as a decrypted colour block image 168.

[0119] With the change means 11 (b), the binary coded-image signal 165 is inputted into either the binary picture field decryption means 91 or the binary picture frame decryption means 92 according to the mode information 163 on a color picture.

[0120] In the binary picture field decryption means 91, a binary block image is

decrypted in a field unit from the coding binary picture signal 165. With the binary picture frame decryption means 92, a binary block image is decrypted from the coding binary picture signal 165 with the frame structure.

[0121] With the change means 12 (b), according to the mode information 163, either the output of the binary picture field decryption means 91 or the output of the binary picture frame decryption means 92 is chosen, and it is outputted as a decrypted binary block image 169.

[0122] According to the gestalt of this operation explained by the above, it can decrypt correctly by decrypting a color picture and a binary picture according to the mode information on the color picture decrypted with the mode decryption judging means 88 to the coded-image signal of a color digital image with interlace structure, and a binary digital image, without using the mode information on a binary picture.

[0123] In addition, although the output destination change change means 11 (a), 11 (b) and the inputting agency change means 12 (a), and 12 (b) are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0124] (Gestalt 11 of operation) Drawing 18 is the block diagram of the image coding equipment in the gestalt 11 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 2 of the

operation shown in the gestalt 1 and drawing 2 of operation which are shown in drawing 1 is attached, and explanation is omitted. In this drawing, a mode judging means choose for every block whether 93 is encoded per whether it encodes in a field unit from a binary picture signal and frame, a binary picture field coding means to by_which 94 encodes a binary block image per field, a binary picture frame coding means to by_which 95 encodes a binary block image per frame, a color-picture field coding means to by_which 96 encodes a colour block image per field, and 97 show a color-picture frame coding means encode a colour block image per frame.

[0125] About the image coding equipment constituted as mentioned above, the actuation is explained below. By the block division means which is not shown all over drawing, a binary digital input picture signal is divided into the two-dimensional block which consisted of two or more pixels, and is inputted into the mode judging means 93 and the change means 11 (a) as a binary block image 162.

[0126] The mode judging means 93 judges either field unit-signal-ized processing or frame unit-signal-ized processing using distribution, correlation, etc. of a pixel value from the inputted binary block image 162, and outputs it as mode information 170.

[0127] The change means 11 (a) inputs the binary block image 162 into either

the binary picture field coding means 94 or the binary picture frame coding means 95 according to the mode information 170. The change means 11 (c) inputs mode information into either the binary picture field coding means 94 or the binary picture frame coding means 94 according to the mode information 170.

[0128] With the binary picture field coding means 94, the mode information 170 is encoded first, and then the binary block image 162 is encoded and outputted for every field. With the binary picture frame coding means 95, the mode information 170 is encoded first, next, it encodes with the frame structure and the binary block image 162 is outputted.

[0129] With the change means 12 (a), according to the mode information 170, the output of the binary picture field coding means 94 or the output of the binary picture frame coding means 95 is chosen, and it outputs as a coding binary picture signal 171. The change means 11 (b) inputs into either the color field coding means 96 or the color frame coding means 97 the colour block image 161 divided into the two-dimensional block which consisted of two or more pixels by the block division means which is not shown all over drawing according to the mode information 170.

[0130] The color picture field coding means 96 encodes and outputs the colour block image 161 for every field. The color picture frame coding means 97 encodes with the frame structure, and outputs the colour block image 161. The

change means 12 (b) chooses the output of the color picture field coding means 96, or the output of the color picture frame coding means 97 according to the mode information 170, and outputs it as a coding color picture signal 172. The multiplexing means 13 multiplexes the coding binary picture signal 171 and the coding color picture signal 172, and outputs the bit stream signal 14.

[0131] It is not necessary to encode the mode information on a color digital image, and, according to the gestalt of this operation explained by the above, improvement in coding effectiveness can be attained to a color digital image signal and a binary digital image signal with interlace structure by encoding a color digital image according to the mode information on a binary digital image.

[0132] In addition, although the output destination change change means 11 (a), 11 (b) and 11 (c), the inputting agency change means 12 (a), and 12 (b) are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0133] (Gestalt 12 of operation) Drawing 19 is the block diagram of the image decryption equipment in the gestalt 12 of operation of this invention. In this drawing, the number same about the same means and same signal as a gestalt 11 of the operation shown in the gestalt 1 of operation shown in drawing 1 , the gestalt 2 of operation shown in drawing 2 , the gestalt 9 of the operation shown in drawing 16 , and drawing 18 is attached, and explanation is omitted. In this

drawing, 98 shows a mode decryption judging means to decrypt the mode information 170 from a coding binary picture signal.

[0134] About the image decryption equipment constituted as mentioned above, the actuation is explained below. The reverse multiplex means 15 separates and outputs the coding binary picture signal 171 and the coding color picture signal 172 from the bit stream signal 14. the mode decryption judging means 98 separates the mode information on a coding binary picture signal and a binary picture from the coding binary picture signal 171, and outputs the coding binary picture signal 171 -- both the mode information 170 on a binary picture is decrypted.

[0135] The change means 11 (a) inputs the coding binary picture signal 171 into either the binary picture field decryption means 91 or the binary picture frame decryption means 92 according to the mode information 170.

[0136] The binary picture field decryption means 91 decrypts a binary block image in a field unit from the coding binary picture signal 171. The binary picture frame decryption means 92 decrypts a binary block image from the coding binary picture signal 171 with the frame structure.

[0137] According to the mode information 170, the change means 12 (a) chooses either the output of the binary picture field coding means 91, or the output of the binary picture frame coding means 92, and outputs it as a

decrypted binary block image 169.

[0138] With the change means 11 (b), the coding color picture signal 172 is inputted into either the color picture field decryption means 89 or the color picture frame decryption means 90 according to the mode information 170 on a binary picture.

[0139] In the color picture field decryption means 89, a colour block image is decrypted in a field unit from the coding color picture signal 172. With the color picture frame decryption means 90, a colour block image is decrypted from the coding color picture signal 172 with the frame structure.

[0140] With the change means 12 (b), according to the mode information 170, either the output of the color picture field decryption means 89 or the output of the binary picture frame decryption means 92 is chosen, and it is outputted as a decrypted colour block image 168.

[0141] According to the gestalt of this operation explained by the above, it can decrypt correctly by decrypting a color picture and a binary picture according to the mode information on the binary picture decrypted with the mode decryption judging means 98 to the coded-image signal of a color digital image with interlace structure, and a binary digital image, without using the mode information on a color picture.

[0142] In addition, although the output destination change change means 11 (a),

11 (b) and the inputting agency change means 12 (a), and 12 (b) are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0143] (Gestalt 13 of operation) Drawing 20 is the block diagram of the image coding equipment in the gestalt 13 of operation of this invention. The number same about the same means and same signal as a gestalt 1 of the operation shown in drawing 1 in this drawing is attached, and explanation is omitted.

[0144] A field pixel value distribution investigation means by which 187 investigates the distribution condition of the pixel value of the circumference pixel of a view pixel per field in this drawing, A frame pixel value distribution investigation means by which 188 investigates the distribution condition of the pixel value of the circumference pixel of a view pixel per frame, A probability-distribution decision means by which 189 determines the probability of the pixel value of a view pixel according to the distribution condition of a circumference pixel value, A pixel value coding means to algebraic-sign-ize the pixel value of a view pixel according to the probability distribution which 190 determined, 191 compares the coded signal encoded per field with the coded signal encoded per frame, and judges the field/frame mode, and a mode judging means to output mode information, and 192 show the memory holding a pixel value.

[0145] About the image coding equipment constituted as mentioned above, the actuation is explained below. By the block division means which is not shown all over drawing, the binary digital image 180 divided into the two-dimensional block which consisted of two or more pixels is first inputted into memory 192, and a pixel value is held.

[0146] The field pixel value distribution investigation means 187 and the frame pixel value distribution investigation means 188 read the surrounding pixel value of the pixel for coding from memory 192, and determine the distribution condition of a pixel value. Drawing 22 and drawing 23 show the block divided into 8x8 pixels, and the pixel of the pixel location A is a pixel for coding. Moreover, the pixel by which hatching was carried out black shows a pixel [finishing / coding]. With the field pixel value distribution investigation means 187, the pixel value of the pixel locations B, C, and D shown in drawing 22 is outputted as a circumference pixel value of the pixel A for coding. Moreover, with the frame pixel value distribution investigation means 188, the pixel value of the pixel locations B, C, and D shown in drawing 23 is outputted as a circumference pixel value of the pixel A for coding.

[0147] With the probability-distribution decision means 189, the probability distribution of the pixel value of the pixel for coding is determined from the distribution condition of the circumference pixel value determined with the field

pixel value distribution investigation means 187 and the frame pixel value distribution investigation means 188. That is, when (B, C, D) are (black, white, and black), the probability for the probabilities for the pixel A for coding to be black to be 0.75 and white is set to 0.25 from the probability-distribution table of drawing 24 .

[0148] With the pixel value coding means 190, a pixel value is algebraic-sign-ized based on the probability distribution determined with the probability-distribution decision means 189, and a coded-image signal is outputted. an algebraic sign -- the probability of occurrence of a symbol sequence (data sequence which should be encoded) -- responding -- [-- it divides at the 0 or 1 section, and arithmetic operation constitutes a symbolic language on a target serially, and let the binary fractional value which shows the location within the section finally obtained be the sign of the sequence. here -- [-- it is shown that notations called 0 and 1 are the zero or more sections [less than one] or a field.

[0149] The conceptual diagram of an algebraic sign is shown and explained to drawing 30 . Based on the probability-distribution table of drawing 24 , the field on a numerical straight line is set up from the circumference pixel values B, C, and D of the object pixel called for with the probability-distribution decision means 189. although the procedure is shown in (Table 1) -- the symbol

sequence S= 11100 -- when .... is encoded, the probability of occurrence used as "1" of the circumference pixels B, C, and D to an object pixel and the probability of occurrence used as "0" are 0.95 and 0.05 from the probability-distribution table of drawing 24 . If shown in drawing 30 , it can express by P0 and P1, and when an object pixel is "1", the field by the side of P0 is chosen.

[0150]

[Table 1]

シンボル	周辺画素 B, C, D			発生確率	区画幅	区間の下限値	区間の上限値
1	1	1	1	0.95	0.95	0.0	0.95
1	1	1	1	0.95	0.903	0.0	0.903
1	1	1	1	0.95	0.857	0.0	0.857
0	1	0	1	0.25	0.214	0.643	0.857
0	0	0	0	0.95	0.203	0.654	0.857
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
符号出力							

[0151] Next, about the 2nd object pixel, to the 1st field of A1, a field is divided based on the probability of occurrence, a field is chosen according to the pixel value of an object pixel, and the field of A11 is chosen. Henceforth, to the field which the pixel for front chose, based on the probability of occurrence, a field is divided similarly, and one of fields are chosen by the object pixel, and let the

binary fractional value which shows the location of the field of the last pixel be the sign of the sequence.

[0152] With the mode judging means 191, the coded-image signal acquired based on the probability distribution which investigated the distribution condition of a pixel value per field is compared with the coded-image signal chosen based on the probability distribution which investigated the distribution condition of a pixel value per frame for every block, the field/frame mode which chooses code length's shorter one are judged, and it outputs as mode information 185.

[0153] With the change means 12, according to the mode information 185, either a field unit-signal-ized picture signal or a frame unit-signal-ized picture signal is chosen, and it outputs as a coded-image signal 186. The multiplexing means 13 multiplexes the mode information 185 and the coded-image signal 186, and outputs them as a bit stream signal 14.

[0154] According to the gestalt of this operation explained by the above, a binary digital image with interlace structure In case probability distribution of the pixel value of the pixel for coding is determined and algebraic-sign-ized according to the distribution condition of a circumference pixel value Improvement in coding effectiveness can be attained by judging and changing the direction with sufficient any of the technique of determining probability distribution per field, and the technique of determining probability distribution per frame or

effectiveness for every block with the mode judging means 191.

[0155] In addition, although the gestalt of this operation showed drawing 22 and 23 showed the 8x8-pixel block, it can carry out similarly about the block which consisted of mxn pixels of arbitration.

[0156] Moreover, although 3 pixels of B, C, and D were used in drawing 22 , and 23 and 24 as a circumference pixel of the pixel for coding, it is also possible to use much more pixels.

[0157] (Gestalt 14 of operation) Drawing 21 is the block diagram of the image decryption equipment in the gestalt 14 of operation of this invention. In this drawing, the number same about the same means and same signal as the gestalt 1 of operation shown in drawing 1 , the gestalt 2 of operation shown in drawing 2 , and the gestalt 13 of the operation shown in drawing 20 is attached, and explanation is omitted.

[0158] A pixel value decryption means by which probability distribution responds and 194 carries out the arithmetic decryption of the image for a decryption in this drawing, and 193 show the decrypted binary digital image signal.

[0159] About the image decryption equipment constituted as mentioned above, the actuation is explained below. The demultiplexing means 15 separates and outputs the mode information 185 and the coded-image signal 186 from the bit stream signal 14. With the change means 11, the pixel value data of the pixel

[finishing / a decryption / already] currently held in memory 192 according to the mode information 185 are inputted into the field pixel value distribution investigation means 187 or the frame pixel value distribution investigation means 188.

[0160] With the field pixel value distribution investigation means 187, in the block for a decryption illustrated to drawing 22 , supposing the pixel location A is a pixel for a decryption The pixel by which hatching was carried out black is already decryption ending, and outputs the pixel value of the pixel locations B, C, and D as a circumference pixel value of the pixel A for a decryption. With the frame pixel value distribution investigation means 188 In the block for a decryption illustrated to drawing 23 , the pixel value of the pixel locations B, C, and D is similarly outputted as a surrounding circumference pixel value of the pixel A for a decryption.

[0161] With the change means 12, either the distribution condition of the pixel value in a field unit or the distribution condition of the pixel value in a frame unit is inputted into the probability-distribution decision means 189 according to the mode information 185.

[0162] With the probability-distribution decision means 189, the probability distribution of the pixel value of the pixel for coding is determined from the distribution condition of the circumference pixel value determined with the field

pixel value distribution investigation means 187 or the frame pixel value distribution investigation means 188. That is, when (B, C, D) are (black, white, and black), the probability for the probabilities for the pixel A for a decryption to be black to be 0.75 and white is set to 0.25 by the probability-distribution table of drawing 24 .

[0163] With the pixel value decryption means 194, based on the probability distribution determined with the probability-distribution decision means 189, a pixel value is decrypted by arithmetic decryption, and it outputs as a decryption picture signal 193. Moreover, the outputted decryption picture signal is inputted into memory 192, and is held. A decryption of an algebraic sign divides a field based on the probability distribution determined from the circumference pixel of the object pixel A in the probability-distribution table of drawing 24 , and determines the value of an object pixel by in which the location of the encoded field exists.

[0164] In case the probability distribution of the pixel value of the pixel for a decryption is determined according to the distribution condition of the pixel value of the circumference pixel of the pixel for a decryption in the image decryption equipment which decrypts the pixel value of a binary digital image using an algebraic sign according to the gestalt of this operation explained by the above, also in an image with interlace structure, it can decrypt correctly by using the

mode information 185 and the change means 11 and 12.

[0165] In addition, although the output destination change change means 11 and the inputting agency change means 12 are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0166] Moreover, in drawing 22 and drawing 23 , although the 8x8-pixel block was shown, it can carry out similarly about the block which consisted of mxn pixels of arbitration.

[0167] Furthermore, in drawing 22 , drawing 23 , and drawing 24 , although 3 pixels of B, C, and D were used as a circumference pixel of the pixel for coding, it is also possible to use much more pixels.

[0168] (Gestalt 15 of operation) Drawing 25 is the block diagram of the image coding equipment in the gestalt 15 of operation of this invention. The number same about the same means and same signal as a gestalt 13 of the operation shown in the gestalt 1 of operation shown in drawing 1 in this drawing, the gestalt of the operation shown in drawing 13 , and drawing 20 is attached, and explanation is omitted.

[0169] A mode judging means for 51 to judge the field/frame mode and to output mode information in this drawing, A coding means by which 52 encodes a binary digital image, a field motion compensation means by which 53 performs a

motion compensation per field, A frame motion compensation means by which 54 performs a motion compensation per frame, the memory holding the image, with which 56 was decrypted, A decryption means by which 57 decrypts a binary digital image from a coded-image signal, A field motion presumption means to presume by 58 moving per field, a frame motion presumption means to presume by 59 moving per frame, A field pixel value distribution investigation means by which 201 investigates the distribution condition of the same location as the pixel for coding, and the pixel value of the pixel of the circumference of it in a motion compensation prediction image per field, A frame pixel value distribution investigation means by which 202 investigates the distribution condition of the same location as the pixel for coding and the pixel value of the pixel of the circumference of it in a motion compensation prediction image per frame, and 200 show a motion compensation prediction picture signal, and 203 shows a coded-image signal.

[0170] About the image coding equipment constituted as mentioned above, the actuation is explained below. First, it moves first and presumption and motion compensation processing are explained. The binary digital image divided into the two-dimensional block which consisted of two or more pixels by the block division means which is not shown all over drawing is inputted into the field motion presumption means 58 and the frame motion presumption means 59 as

an input picture signal 131 for every block.

[0171] With the field motion presumption means 58, it presumes by moving for every field from the input picture signal 131 and the reference picture signal 136, and the field motion vector 138 is outputted. With the frame motion presumption means 59, motion presumption is performed from the input picture signal 131 and the reference picture signal 136 with the frame structure, and the frame motion vector 139 is outputted.

[0172] With the field motion compensation means 53, a motion compensation is performed for every field using the reference picture signal 136 and the field motion vector 138, and the field prediction image 134 is outputted. With the frame motion compensation means 54, motion presumption / motion compensation is performed from the reference picture signal 136 and the frame motion vector 139 with the frame structure, and the frame prediction picture signal 135 is outputted.

[0173] With the mode judging means 51, the field prediction picture signal 134 is compared with the frame prediction picture signal 135, the mode whose motion compensation prediction error decreases more is judged, and it outputs as mode information 133.

[0174] With the pixel value decryption means 194, based on the probability distribution which investigated the pixel value distribution condition with the

frame pixel value distribution investigation means 202 or the field pixel value distribution investigation means 201, and determined the motion compensation prediction picture signal 200 chosen by the mode information 185 with the probability-distribution decision means 189, a pixel value is decrypted by arithmetic decryption, and it outputs as a decryption picture signal 204. Moreover, the outputted decryption picture signal is inputted into memory 204, and is held. The change means 12 (c) outputs either the motion vector 138 from the field motion presumption means 58, or the motion vector 139 from the frame motion presumption means 59 according to the mode information 133.

[0175] Next, the coding processing algebraic-sign-ized based on probability distribution is explained. With the change means 12 (a), according to the mode information 133, either the field prediction picture signal 134 or the frame prediction picture signal 135 is chosen, and the motion compensation prediction image which motion compensation prediction was carried out and was obtained is inputted into the field pixel value distribution investigation means 201 and the frame pixel value distribution investigation means 202.

[0176] With the field pixel value distribution investigation means 201 and the frame pixel value distribution investigation means 202, the same location as the pixel for coding in the motion compensation prediction picture signal 200 and the pixel value of the pixel of the circumference of it are investigated. Drawing 27

and drawing 28 show the block divided into 8x8 pixels, and the block with which motion compensation prediction of drawing 27 (a) and drawing 28 (a) was carried out, drawing 27 (b), and drawing 28 (b) show the block for coding.

[0177] With the field pixel value distribution investigation means 201, supposing the pixel for coding is the pixel A shown in drawing 27 (b), the pixel value of C and D which serves as the circumference pixel per the pixel B of drawing 27 (a) which is in the same location as Pixel A within a motion compensation prediction block, and field will be outputted as a distribution condition of the circumference pixel value of the pixel A for coding.

[0178] With the frame pixel value distribution investigation means 202, supposing the pixel for coding is the pixel A shown in drawing 28 (b), the pixel value of C and D which serves as the circumference pixel per the pixel B of drawing 28 (a) which is in the same location as Pixel A within a motion compensation prediction block, and frame will be outputted as a distribution condition of the circumference pixel value of the pixel A for coding.

[0179] With the probability-distribution decision means 189, the probability distribution of the pixel value of the pixel for coding is determined from the distribution condition of the circumference pixel value determined with the field pixel value distribution investigation means 201 and the frame pixel value distribution investigation means 202. That is, when (B, C, D) are (black, white,

and black), the probability for the probabilities for the pixel value of the pixel A for coding to be black to be 0.75 and white is set to 0.25 from the probability-distribution table shown in drawing 29 .

[0180] With the pixel value coding means 190, calculation coding of the pixel value is carried out based on the probability distribution determined with the probability-distribution decision means 189, and a coded-image signal is outputted.

[0181] With the mode judging means 191, the coded-image signal acquired based on the probability distribution which investigated the distribution condition of a pixel value per field is compared with the coded-image signal chosen based on the probability distribution which investigated the distribution condition of a pixel value per frame for every block, and by judging code length's shorter one, the field/frame mode is determined and it outputs as mode information 185.

[0182] With the change means 12 (b), according to the mode information 185, either a field unit-signal-ized picture signal or a frame unit-signal-ized picture signal is chosen, and it outputs as a coded-image signal 203.

[0183] The multiplexing means 13 multiplexes the mode information 133 and 185, the motion vector signal 140, and the coded-image signal 203, and outputs the bit stream signal 14.

[0184] According to the gestalt of this operation explained by the above, a binary

digital image with interlace structure In case probability distribution of the pixel value of the pixel for coding is determined and algebraic-sign-ized according to the distribution condition of the pixel value of a motion compensation prediction image Improvement in coding effectiveness can be attained by judging and changing the direction with sufficient any of the technique of determining probability distribution per field, and the technique of determining probability distribution per frame or effectiveness for every block with the mode judging means 191.

[0185] In addition, although the gestalt of this operation showed drawing 27 and 28 showed the 8x8-pixel block, it can carry out similarly about the block which consisted of mxn pixels of arbitration.

[0186] Moreover, although 3 pixels of the pixel locations B, C, and D were used as an object pixel which investigates the distribution condition of the pixel value of a motion compensation prediction image, it is also possible to use much more pixels at drawing 27 , and 28 and 29.

[0187] (Gestalt 16 of operation) Drawing 26 is the block diagram of the image decryption equipment in the gestalt 16 of operation of this invention. In this drawing, the number same about the same means and same signal as the gestalt 1 of operation shown in drawing 1 , the gestalt 2 of operation shown in drawing 2 , the gestalt 13 of operation shown in drawing 20 , the gestalt 14 of

operation shown in drawing 21 , and the gestalt 15 of the operation shown in drawing 25 is attached, and explanation is omitted.

[0188] In this drawing, 204 shows the decrypted binary digital image signal. About the image decryption equipment constituted as mentioned above, the actuation is explained below. The demultiplexing means 15 separates and outputs the mode information 133 and 185, the motion vector signal 140, and the coded-image signal 203 from the bit stream signal 14. The motion vector signal 140 is inputted into either the field motion compensation means 53 or the frame motion compensation means 54 according to the mode information 133 by the change means 11.

[0189] The field motion compensation means 53 performs a motion compensation for every field using the reference picture signal 136 and the motion vector signal 140, and outputs the field prediction picture signal 134. The frame motion compensation means 54 performs a motion compensation using the reference picture signal 136 and the motion vector signal 140 with the frame structure, and outputs the frame prediction picture signal 135.

[0190] Supposing Pixel A is a pixel for a decryption in the block for a decryption which consists of 8x8 pixels illustrated to drawing 27 (b) with the field pixel value distribution investigation means 201 In the motion compensation prediction block illustrated to drawing 27 (a) The pixel B of the same location as Pixel A

And the pixel value of the pixels C and D which are circumference pixels of Pixel B per field is outputted as a circumference pixel value of the pixel A for a decryption. Moreover, supposing Pixel A is a pixel for a decryption in the block for a decryption which consists of 8x8 pixels illustrated to drawing 28 (b) with the frame pixel value distribution investigation means 202 In the motion compensation prediction block illustrated to drawing 28 (a), the pixel value of the pixels C and D which are circumference pixels of Pixel B per the pixel B of the same location as Pixel A and frame is outputted as a circumference pixel value of the pixel A for a decryption.

[0191] With the change means 12, either the distribution condition of the pixel value in a field unit or the distribution condition of the pixel value in a frame unit is inputted into the probability-distribution decision means 189 according to the mode information 185.

[0192] With the probability-distribution decision means 189, the probability distribution of the pixel value of the pixel for coding is determined from the distribution condition of the circumference pixel value determined with the field pixel value distribution investigation means 201 or the frame pixel value distribution investigation means 202. That is, when (B, C, D) are (black, white, and black), the probability for the probabilities for the pixel A for coding to be black to be 0.75 and white is set to 0.25 by the probability-distribution table

shown in drawing 29 .

[0193] With the pixel value decryption means 194, based on the probability distribution determined with the probability-distribution decision means 189, a pixel value is decrypted by arithmetic decryption, while outputting as a decryption picture signal 204, a note is made, and it inputs into 56.

[0194] In case the probability distribution of the pixel value of the pixel for a decryption is determined according to the distribution condition of the pixel value of a motion compensation prediction image in the image decryption equipment which decrypts the pixel value of a binary digital image using an arithmetic decryption according to the gestalt of this operation explained by the above, also in an image with interlace structure, it can decrypt correctly by using the mode information 185 and the change means 11 and 12.

[0195] In addition, although the output destination change change means 11 and the inputting agency change means 12 are used with the gestalt of this operation, the same effectiveness can be acquired even if it uses either the change means 11 or the change means 12.

[0196] Moreover, in drawing 27 and 28, although the 8x8-pixel block was shown, it can carry out similarly about the block which consisted of mxn pixels of arbitration.

[0197] Furthermore, although 3 pixels of B, C, and D were used as a

circumference pixel of the pixel for coding, it is also possible to use much more pixels at drawing 27 , and 28 and 29.

[0198] (Gestalt 17 of operation) This invention can be easily carried out by other independent computer systems by a program's realizing in software the configuration shown in the gestalten 1-16 of operation, and recording this on record media, such as a floppy disk, and transporting it. A floppy disk is shown in drawing 31 as an example of a record medium.

[0199] In addition, in the gestalt of this operation, although the floppy disk was shown as a record medium, if programs, such as an IC card, and CD-ROM, a magnetic tape, are recordable, it can carry out similarly.

[0200]

[Effect of the Invention] As mentioned above, in the image coding equipment / image decryption equipment which carries out block division, and encodes / decrypts a digital image with interlace structure for every block as effectiveness of this invention, an improvement effect with remarkable coding effectiveness is acquired by choosing the mode with sufficient coding effectiveness in consideration of field structure or the frame structure for every block.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram of the image coding equipment in the gestalt 1 of operation of this invention

[Drawing 2] The block diagram of the image decryption equipment in the gestalt 2 of operation of this invention

[Drawing 3] The block diagram of the image decryption equipment in the gestalt 3 of operation of this invention

[Drawing 4] (a) Drawing showing a pixel value-change location and a change prediction location

(b) Drawing showing the pixel value-change location and change prediction location of a field mode decryption

(c) Drawing showing a field mode decryption block

[Drawing 5] Drawing showing the pixel value-change location and change prediction location of a frame mode decryption

[Drawing 6] Drawing showing a frame mode decryption block

[Drawing 7] (a) Drawing showing the digital image block of field structure

(b) Drawing showing the digital image block of the frame structure

[Drawing 8] The block diagram of the image coding equipment in the gestalt 4 of operation of this invention

[Drawing 9] The block diagram of the image decryption equipment in the gestalt 5 of operation of this invention

[Drawing 10] Drawing showing the example of processing of a rise sampling

[Drawing 11] Drawing showing ****** of correlation between Rhine

[Drawing 12] The block diagram of the image coding equipment in the gestalt 6 of operation of this invention

[Drawing 13] The block diagram of the image decryption equipment in the gestalt 7 of operation of this invention

[Drawing 14] The block diagram of the image decryption equipment in the gestalt 8 of operation of this invention

[Drawing 15] Drawing showing the conceptual diagram of motion presumption

[Drawing 16] The block diagram of the image coding equipment in the gestalt 9 of operation of this invention

[Drawing 17] The block diagram of the image decryption equipment in the gestalt 10 of operation of this invention

[Drawing 18] The block diagram of the image coding equipment in the gestalt 11 of operation of this invention

[Drawing 19] The block diagram of the image decryption equipment in the gestalt 12 of operation of this invention

[Drawing 20] The block diagram of the image coding equipment in the gestalt 13

of operation of this invention

[Drawing 21] The block diagram of the image decryption equipment in the gestalt 14 of operation of this invention

[Drawing 22] Drawing showing field mode coding / decryption block

[Drawing 23] Drawing showing frame mode coding / decryption block

[Drawing 24] Drawing showing an example of the probability-distribution table of a pixel value

[Drawing 25] The block diagram of the image coding equipment in the gestalt 15 of operation of this invention

[Drawing 26] The block diagram of the image decryption equipment in the gestalt 16 of operation of this invention

[Drawing 27] Drawing showing a field mode motion compensation prediction block and coding/decryption block

[Drawing 28] Drawing showing a frame mode motion compensation prediction block and coding/decryption block

[Drawing 29] Drawing showing an example of the probability-distribution table of a pixel value

[Drawing 30] Drawing showing the conceptual diagram of an algebraic sign

[Drawing 31] Drawing showing an example of the record medium of the computer in the gestalt 17 of operation of this invention

[Description of Notations]

11 Output Destination Change Change Means

12 Inputting Agency Change Means

13 Multiplexing Means

15 Demultiplexing Means

34, 51, 67, 81, 93,191 Mode judging means

32 Frame Down Sample Means

33 52 Binary block image coding means

36, 46, 57, 76 Binary block image decryption means

37 Field Rise Sample Means

38 Frame-up Sample Means

47 Rise Sample Means

48 77 The field / frame rearrangement means

53 Field Block Motion Compensation Means

54 Frame Block Motion Compensation Means

56 64,192 Memory

58 Field Block Motion Presumption Means

59 Frame Block Motion Presumption Means

61 Field Pixel Value Change Location Detection Means

62 Frame Pixel Value Change Location Detection Means

63 Pixel Value Change Location Prediction Means

65 Difference -- Value Count Means

66 Difference -- Value Coding Means

70 Difference -- Value Decryption Means

71 Difference -- Value Addition Means

72 91 Binary block image field decryption means

73 92 Binary block image frame decryption means

82 96 Colour block image field coding means

83 97 Colour block image frame coding means

84 94 Binary block image field coding means

85 95 Binary block image frame coding means

88 98 Mode decryption means

89 Colour Block Image Field Decryption Means

90 Colour Block Image Frame Decryption Means

187 201 Field unit pixel value distribution investigation means

188 202 Frame unit pixel value distribution investigation means

189 Probability-Distribution Decision Means

190 Algebraic-Sign-ized Means

194 Arithmetic Decryption Means